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ON THE ACTION OF HYDROCYANIC ACID, WITH EXPERIMENTS.

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Prussic acid is contained in vegetable life—viz., in the kernel of the cherry, peach, bitter almond, plum, apple pips, apricots; also in the flowers of the peach, cherry laurel and bird cherry, the bark of the latter and the root of the mountain ash. It is doubtful whether it has been obtained from the ergot of rye in any large quantity. It is possible that hydrocyanic acid is the result of the decomposition of some azotized principles contained in the above-mentioned organic substances.* It has also been supposed to be present in some animal decompositions, and has been found in the form of Prussian blue in the blood, urine and menstrual fluid of human beings. The greenish blue discharge of some ulcers has also been attributed to the presence of this acid. The result of the decomposition of cheese does not properly constitute prussic acid, though such has been the opinion of some.

Prussic acid (Hcy, or C_2NH) is a compound of cyanogen, which was the first discovered quasi-simple salt-radical, and hydrogen. Cyanogen burns with a peach-blossom or purple color, evolving carbonic acid and nitrogen. This gas cyanogen is soluble in water and alcohol, but more readily in the latter. Its specific gravity is 1·806, and is composed of two equivalents of carbon and one of nitrogen. Hydrocyanic acid has, in addition, one equivalent of hydrogen. This acid is readily decomposed by light, leaving a black residue, if there is any impurity in the solution.

All the compounds partake of the poisonous character of the acid.

Effects on Animals.—Prussic acid is poisonous to animal and even to vegetable life. Its poisonous effects seem to be conveyed by the blood to the nervous centres. Its absorption is very rapid, as much so by the mouth as when introduced hypodermically. Prussic acid must produce its poisonous effects by its absorption in the blood, for this is the road to the nervous system. This is demonstrated by the following experiment, which I performed on a young kitten.

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* Vide Liebig's Familiar Letters on Chemistry, translated by Dr. John Blyth, p. 220 et seq.

Experiment I.—I tied a string around the upper part of the foreleg of this kitten, and placed under the string a lever, twisting the string as tight as possible. Hydrocyanic acid, one eighth of a drachm diluted, was subcutaneously injected into the lower part of this same leg. No poisonous effects showed themselves for twelve minutes, after which the ligature was removed. In thirty seconds after the removal, labored respiration, and the whole train of poisonous symptoms to be described hereafter, appeared. Death ensued in fifteen minutes after removal of the ligature, and twenty-seven minutes from the moment of injection.

Again, if the spinal cord be divided at the junction of the last dorsal and first lumbar vertebra, and prussic acid be injected into the hind leg of an animal, poisonous symptoms ensue as rapidly as though this operation had not been performed. I have not tried this experiment, although its truth is vouched for by men whose veracity and observation cannot be questioned.*

Prussic acid acts very rapidly, and this induced some persons to think that the nervous system was directly affected. Dr. Webster† says that poisonous symptoms occur before the glass rod can be removed from the tongue. I have not, however, seen so rapid an effect. The shortest time that I have observed was thirty seconds.‡

The rapidity and violence of the symptoms does not depend on the amount taken, provided it be a poisonous dose. Three drops is sufficient, sometimes, to kill a young cat, and ten for an old one; this of the dilute acid. A smaller dose will kill a rabbit. The poison acts more slowly on the reptiles and cold-blooded animals. The horse is not susceptible to the poison, *by the mouth*, as illustrated by the following experiment.

Experiment II.—I gave to a horse of concentrated prussic acid half an ounce in a pint of water. No poisonous effects for three quarters of an hour, but immediately after the exhibition of the drug the horse stamped his feet, and seemed exhilarated. This lasted only a moment or two. I repeated my dose, giving the rest of the ounce in half the above quantity of water. This had only the effect of rousing the horse, who had a severe wound in the hock joint. He broke away from his groom, capering round, and had finally to be killed with the axe.

Dr. Dalton performed the same experiment (not as an experiment, but to kill the animal) with one ounce of the strong acid, with an effect of bringing a horse, apparently expiring, back to life again. I learn from Dr. Stickney, veterinary surgeon of this city, that two ounces of this acid have been administered to a horse without any apparent poisonous effects. It has been used as a remedy for tetanus in a horse, with apparent advantage oftentimes.

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* Vide Stillé on Therapeutics and Materia Medica, p. 212.

† Webster's Chemistry, sect. 723.

‡ Since writing this, poisonous symptoms occurred in a cat twenty seconds after its application to the mouth.

I also learn from Dr. Shattuck that he could not kill a *hyaena* with half an ounce of this poison, given by the mouth.

Also, a gentleman of my acquaintance gave a small quantity of concentrated hydrocyanic acid to a colt, which had broken its scapula. Immediately the animal rushed wildly round his box stall, discharging large quantities of *flatus,* as did the horse which Dr. Dalton tried to kill. This wildness lasted a short time and then ceased, the colt showing no signs of poisoning, and finally had to be butchered.

The rapidity of the poisonous action* does not seem very strange when we remember that ferrocyanide of potash, introduced into the circulation of a horse, has been detected in *twenty-eight seconds* afterwards, as having passed through the lungs, heart and body, on its way back to the right side of the heart.

I mentioned above that this drug acted less violently and more slowly on the reptiles and cold-blooded animals than on the warm-blooded. For instance:—

Experiment III.—I placed two tadpoles in a vessel containing a pint of water, and added thereto one drachm of dilute prussic acid, and in half an hour two drachms more. This seemed to have slight, if any, effect upon the reptiles, though they were observed to roll over, and swim about uneasily, with their bellies upwards. There being no other disturbance for an hour after the first addition of the acid, I left them, perhaps a little more sluggish than usual, and found them dead twelve hours afterwards.

Prussic acid seems to be present in the blood, after its administration, but not in the milk of animals, at least in a poisonous quantity. For—

Experiment IV.—I gave eight drops of dilute hydrocyanic acid to a cat, which was giving suck to a litter of three kittens at the time. In thirty seconds, labored respiration came on with the old cat, and other symptoms of poisoning. In six minutes, paralysis and coma, though the heart was beating rapidly and faintly. As soon as the respiration seemed affected, three eighths of a drachm of carbonate of ammonia was given in three divided doses, and also one fourth of a drachm of chloride of soda. Heart ceased beating in nine minutes. The kittens were suckling all the time, and ten minutes after the death of their mother, when they were removed, milk could be expressed from her nipples; but the kittens had no apparent symptoms of poisoning, not even dilatation of the pupils.

The following experiments will, perhaps, give a pretty clear idea of the symptoms of poisoning by this dangerous drug.

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* Dalton's Human Physiology, p. 284.

Experiment V.—A full-grown cat was etherized, and all the large veins of one of her hind legs were tied. One eighth of a drachm of dilute prussic acid was injected into this leg subcutaneously. In one minute and a half afterwards the respiration was labored, the animal apparently gasping rather than breathing, the muscles of the chest acting spasmodically, with a pause between each breath. The pupils of the eyes were dilated, and, soon after, convulsions came on, preceded by sudden shaking or trembling. The convulsions grew more severe, until all the muscles were rendered tense, and ended in opisthotonos. At the beginning of the convulsion, the cat kept brushing rapidly with the paw, as if there were something on her nose. Slowly the muscles relaxed, and the convulsive movements of the chest subsided. The respiration became abdominal, and eleven minutes after the injection, a peculiar long drawn outcry was uttered. This cat had a succession of convulsions, all running together, each one being more severe than the preceding. At first, the animal appeared restless and uneasy, and fell over on her side suddenly, before her paroxysm commenced. After the cat uttered this cry, a dilute mixture of ammonia was held to her nostrils. In twenty minutes from the time of injection, her respiration was more regular. The eyelids also contracted by irritation, but narcotism was evident. A slight convulsion ensued in forty minutes, the pupil became more dilated; and from this time she began gradually to recover. This cat was killed afterwards by double the quantity previously given; and an examination proved that the recurrent blood was not checked in the limb operated upon. The right side of the heart and *all* the veins were turgid with very dark-colored blood. The muscles of the left ventricle were firm and unyielding, and also filled with blood.

Experiment VI.—A grey cat was treated with the same dose, also injected into the hind leg. This was followed by the same symptoms as in the preceding experiment. This cat also recovered. They both were sitting up, though quiet and sluggish, moving about with apparent difficulty when roused, for an hour and a half after the administration of the drug. They were both full-grown cats. No remedy was tried in this last case.

Experiment VII.—One eighth of a drachm of the acid was injected subcutaneously into the leg of a young kitten belonging to the same litter as in the first experiment. In four or five seconds labored respiration was noticed, gradually becoming abdominal. In a minute, convulsions, opisthotonos, coma, in succession, as above, life being indicated only by the pulsation of the heart, which ceased at the end of eight minutes after the administration of the drug.

Experiment VIII.—The above dose was administered by the mouth to a kitten of the same litter. Labored respiration in *thirty* seconds thereafter, succeeded by the same symptoms as in the other case; though the heart's action was rather more forcible than in the former. The pulsations ceased in eight and a half minutes after ingestion. Respiration in both these experiments seemed entirely absent three minutes after the exhibition of the poison; though gasps could be incited by pressure upwards on the diaphragm as long as the heart continued beating. These two kittens were experimented upon at the same time, and the symptoms were thus compared. This experiment would seem to indicate that the poison acts more speedily by the mouth than by subcutaneous injection, though the death ensued later in the former than in the latter mode of administration.

To show of how little avail reputed antidotes are, let me call attention to experiments numbered V. and VI. In the former case ammonia was inhaled, diluted ten times, and applied very cautiously; this cat, however, did not recover any earlier than No. VI. This method was also applied to the cat with young ones, mentioned in No. IV., and no advantage seemed to be derived. The giving of carbonate of ammonia can hardly be considered an antidote, for a chemical combination, cyanide of ammonium, will be found in the stomach. If all the acid has been absorbed, no stimulation by anything given by the mouth can be of use, for the stomach will not absorb anything, as the muscles are paralyzed, and the animal cannot swallow. Neither is there, in general, time to give any substance to combine with the acid to produce a harmless compound, even if such could be found. No effect seems to occur from a subcutaneous injection of carbonate of ammonia. (Experiment X.)

Experiment IX.—Eight drops of this drug was put into the mouth of a young rabbit. In less than a minute symptoms of poisoning were noticed, as in the above experiment. Immediately, cold affusion of water was tried upon the spine and then on the chest, in alternation, but in three minutes the rabbit was dead.

Experiment X.—I then subcutaneously injected one fourth of a drachm of the acid into the foreleg of a pregnant doe. In one minute and a half afterwards her respiration became labored, and I then injected three fourths of a drachm of carbonate of ammonia under the skin, and ammonia diluted ten times was held to her nostrils. Some slight abatement of convulsions. This was of no avail. Respiration ceased, but was incited artificially by pressure upwards on the diaphragm, which was continued for ten minutes. After the cessation of the heart's action, there was no response to this incitation. Tracheotomy was then performed, and the thorax opened. Air was then forced into the lungs, and, alternately with each blow, the heart was squeezed. We could not, however, resuscitate the doe.

I performed several other experiments (Mr. H. G. Fitz, of the medical class, assisting me, to whom I refer to corroborate my record of these experiments); in three cases giving strychnia for an antidote, but not with any benefit. Symptoms of poisoning were somewhat more varied than when prussic acid was given alone, and the animals seemed to live longer. The same morbid appearances were observed after death as in the previous experiments.

I now propose to deduce from these and other experiments the symptoms of poisoning invariably occurring after the ingestion of this drug. After a poisonous dose has been placed in an animal's mouth, a period, varying from half a minute to two minutes, seems to elapse without any positive symptom other than restlessness. The first symptom to be noticed is a trembling and twitching in the muscles of the body, especially in the extremities and head. Next, a panting and gasping, as if there was some suffocation. After this, the respiration becomes more labored. This terminates what might be called the first stage of poisonous symptoms. In a period of time after ingestion of the poison, varying from one and a quarter to five minutes, convulsions occur. These come on suddenly, the animal falling over as if struck down, and after this the convulsions seem constant, ending either in opisthotonos, or, in two cases, in emprosthotonos, the body forming a complete arc. During and just before the convulsions, the pupils dilate very remarkably. The breathing seems to be arrested as during the convulsions. These convulsions last from a minute to two minutes, and afterwards the animal lies upon its side, with its muscles relaxed, and perfectly still, occasionally giving gasps, which can at any time be excited by a sudden tap on the chest, or a pressure of the diaphragm. From this time coma ensues, and death, were it not for the heart's pulsation, is apparent.

The morbid appearances are:—congestion of the whole venous system, especially of the brain, but very marked throughout the whole body. The right side of the heart was also turgid, but the left ventricle was generally firm and unyielding, though the left auricle was empty in all cases. The lungs were sometimes pale, and sometimes red with blood. Prussic acid was detected, by the silver test, in the lungs, stomach, venous blood, and heart. The rigor mortis lasted for two days in two cases, when the *post-mortem* examination was made. The other autopsies were made immediately after death.

As to the action of this poisonous drug, I have little to say. The symptoms point to a derangement (probably depressing) of the nervous system, especially of the spinal cord. The cerebrum must also be affected, judging from the various accidents which have occurred by the poisoning of men by this drug. The case* which occurred at the Massachusetts General Hospital in April last would illustrate this point, perhaps.

"Examination on entrance" (I take the words from the records of the Hospital). "Patient was found *perfectly insensible*; respiration slow and rather labored; pupils dilated, and eyes open, fixed and protruded; conjunctivæ very slightly injected; face and neck congested, livid, with veins distended and prominent; pulse full, bounding, regular and rapid. Patient lying immovable and relaxed on table; skin on forehead hot; temperature of extremities normal." Such was the train of symptoms. "Afterwards the patient had a paroxysm, convulsions of arms and legs, followed by rigidity; throwing back of head; some tendency to opisthotonos." This agrees perfectly with the symptoms in my experiments on animals. I forgot to mention that in all my cases circulation was very much accelerated, even to twice the usual number of pulsations. In this last case, when the patient returned to consciousness, he had suffered no pain, and had been unmindful of what passed around him, showing that the brain had undergone functional disturbance.

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* Vide Boston Medical and Surgical Journal of May 17.

I think that I have gone sufficiently into detail to show both how fatal a poison hydrocyanic acid is, and what are the symptoms to be expected. I am at a loss to explain its physiological action, however. It may, perhaps, be some chemical action on the nerve-fibre, destroying its vital power, and producing a fatal effect upon life. We know that vegetable life is killed by this acid acting upon it, and we know that other acids destroy the tissue of the human body, entering into a chemical decomposition. Why might not this acid have some chemical affinity for the nerve-fibre, being carried through the body to the nerves by the blood? I do not know any experiment to prove this, however.

All the salts of this acid are poisonous. It seems strange that so violent a poison should ever be of any use in medicine. Yet its exhibition has shown its benefit. At one time it was even thought to be a certain cure for phthisis pulmonalis. To show by what means a drug may be *reputed* to perform a cure, I will tell the following story, vouched for by one who heard the truth from the patient:—

A young man, by the name of S——g, was far gone in consumption. A physician at Bristol, R. I., told him that he had great faith that prussic acid would work a cure, and asked the man if he would run the risk of taking so violent a poison. The patient consented. A dose, sufficient to make him feel "as though electricity were flying from his hands and feet," was given him. He soon after became unconscious, and remained so for some time. After recovering from the immediate effects of the drug, the Doctor told him to buy a horse and chaise, and travel all through New England for the whole of that summer, eating all the healthy food he liked, especially cream and eggs. The following autumn he was sent to Cuba, remained there, interested in business, and was alive to relate this story, being then 70 years of age. Now, prussic acid had little to do with the cure of *that* case of consumption. The hygienic principles built up that patient. One dose of prussic acid could hardly prevent the formation and softening of tubercles.

However, oftentimes an irritative cough in a consumptive patient may be greatly alleviated by the exhibition of one or two drops of dilute hydrocyanic acid, given three times a day. But the cough does not produce tubercles, nor will this medicine prevent their formation. Also, in cases of an irritable stomach, occurring in phthisical patients, or from some nervous deficiency, the same dose will prevent nausea and vomiting, and may, sometimes, increase the appetite for food.

This drug has also been considered useful as a lotion in neuralgia, cephalalgia and the like painful troubles, but not when there is an inflammation of the nerve. In sciatica, its use has not been successful. Magendie has used, in these troubles, hydrocyanate of potash, which is nothing but cyanide of potash diluted in eight times its weight of water, and says that a vegetable acid will prevent the decomposition of this salt. This has also been used internally in the same dose as hydrocyanic acid. I give Magendie's prescriptions:—

Pectoral Mixture of Magendie.—℞. Potass. hydrocyanic. med., ʒ i.; aquæ distillat., Oi.; sacchar. purif., ℥ iss. M. ʒ v. 2 t. d. Or, ℞. Potass. cyanid., amyli, aa gr. iv.; syrup., q. s. Ut fiat massa in pil. viij. div. Dose, a pill night and morning, in convulsions, dyspnœa, &c.

I should be disposed, however, to limit the use of this drug to functional nervous irritation, in combination with iron, cod-liver oil, alcohol, or some such tonic; and in the case of nervous coughs connected with uterine disease, but only, however, with a view to palliation rather than a permanent cure.

DR. WEBBER'S ESSAY ON CEREBRO-SPINAL MENINGITIS.

[Continued from page 65.]

HISTORY.

Foreign History.—It is difficult to judge with regard to the nature of many diseases described by old authors, and still more difficult to satisfactorily prove that they are speaking of complaints essentially the same as those which we at the present day observe. If petechiæ were the prominent symptom of cerebro-spinal meningitis and confined to that disease alone, the task would be comparatively easy. But there is such a variety of symptoms, some of which closely resemble those of typhus—not only the eruption, but also the nervous and other symptoms—that it is very difficult to draw the line of separation.

The first distinct notice of petechiæ as a symptom is by Jacobus de Partibus, a French physician, who was driven from Paris on account of his opposition to the abuse of the baths, and resided afterwards at Tournay, where he died in 1465.* Though all the epidemics in which petechiæ are described among the symptoms may not have been instances of cerebro-spinal meningitis, yet from this date we have such descriptions more or less complete, and in some we can recognize a strong resemblance to the epidemics which have occurred in more modern times and borne that name.

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* Sprengel's History of Medicine.

In 1480 and 1481, a putrid fever, accompanied with phrenitis, prevailed in Westphalia, Hesse and Friesland.*

In 1503, an epidemic prevailed in Europe called *fièvre cérébrale, decephalie, céphalalgie épidémique.* The symptoms most generally observed were, a violent delirium, convulsions, contractions of the limbs, immediately followed by prostration and coma. The pulse was frequent, irregular, feeble. Death happened speedily, sometimes in a few hours, more often during the third or fourth day.†

In 1505, an epidemic petechial fever raged in Upper Italy, of which we have a description. "This fever commenced with symptoms of little gravity; subsequently, there were developed all the signs of malignancy, with an extreme prostration of the powers. Heaviness of the head, dulness of the senses, delirium, and redness of the eyes, announced the affection of the nervous system. The urine was white and turbid, and the alvine dejections exhaled a fœtid odor. Towards the fourth or seventh day spots appeared, which did not lessen the intensity of the symptoms. The patient fell into a comatose state, or into complete insomnia; retention of urine occurred, without remarkable thirst; and, finally, hæmorrhages, which diminished his powers, and announced the approach of death." Such is the description, by Sprengel, of this fever, which carried off "an infinite number of sick," and which prevailed also all over Europe.‡

In 1508, Germany suffered from epidemic encephalitis and malignant pneumonia.§

In 1510, we again find mention made of *fièvre cérébrale.*‖

Buserius, in his Institutes, gives a good description of cerebro-spinal meningitis, under the name of petechial fever. He also mentions the *post-mortem* appearances.

"Frequently the membranes of the brain are found to be of a dark color, their vessels distended with black blood, and the cortical part of the brain somewhat livid; the stomach and intestines swelled, hard and black; the pancreas, liver and mesentery enlarged. In patients who had been cut off by hiccup, the stomach has frequently abounded with black spots. In others the veins and the membranes of the brain were varicose; the lungs gangrenous and sphacelated, and the blood in the cavities of the heart black and dissolved. Sometimes also abscesses of the brain were present, as well as of the breast, or abdomen. Very frequently, however, no visible taint is discovered anywhere which can be considered as the cause of the patient's death." The account of the symptoms given by Buserius is also very good. Under this description he mentions an epidemic which occurred in 1528. Sprengel also mentions the same epidemic which, during the winter of 1527–28, prevailed in Upper Italy.

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* Bascome on Epidemics. London. 1851.

† Macartin, Poirsin et Bricheteau, in Bul. de l'Acad. de Med., t. 9.

‡ Sprengel and Bascome, op. cit.

§ Bascome, op. cit.

‖ Macartin, Poirsin et Bricheteau, loc. cit.

In 1556 a disease similar to this occurred in England and France; in 1557 in Spain, where it was as mortal as the plague; in 1564 it occurred in many places; and from 1569 to 1574 continued to prevail with much mortality. It was at Trent in 1591, and Florence in 1592.*

The epidemic of 1557, mentioned by Sprengel as described by Coyttarus, prevailed in the environs of Poitiers, La Rochelle, Augoulême and Bordeaux. It commenced in the month of May, and was so deleterious that, according to the expression of Coyttarus, the sick seemed to die rather from fear than from the disease itself. Sprengel also mentions an epidemic which showed itself in 1587 in Lombardy, described by André Tréviso, of Fontaneto. It prevailed during the winter; in the spring it was complicated with pleurisy, buboes and parotitis, and sometimes by worms. The same author speaks of the epidemic of 1591, described by Octavien Roboreto, which occurred at Trent after a warm summer.

The epidemic of 1557, in Spain, is mentioned by Bascome. He also speaks of a spotted fever which prevailed the previous year in Spain, but seemingly different from that in 1557. He mentions the epidemic of 1564, which was accompanied by fatal quinsies.

In the seventeenth century mention is not made so frequently of petechial fever. In 1604, Bascome says the "punticular fever" extended and raged with great violence all over Spain, attacked old and young, none escaping.

In 1677 Buserius mentions the occurrence of the petechial fever in Italy.

In 1685, in the month of February, commenced the fever of which Sydenham gave a description under the name "febris nova." Intermittents had been the prevalent class of fevers from 1677 to 1683. The winter of the latter year was very severe, "ut nemo quisquam viventium illi parem, vel intentissimo eo frigoris gradu, vel prælongo temporis tractu, videris unquam;" that is, the "oldest inhabitant" could not remember so severe a winter. The winter of 1684 was not quite so severe, though more so than usual. He first considered the new disease which appeared in February, 1685, to be the same as peripneumonia, but subsequently changed his opinion. "The symptoms observed with what care I could give them are and were nearly these. The patient is attacked by heat and cold alternately; oftentimes there is complaint of pain in both head and limbs; the pulse is not unlike the pulse of health; blood drawn from a vein is frequently similar to pleuritic blood. The patient often suffers from cough, which, with the other symptoms of peripneumonia, yielded the quicker, the longer after winter the attack occurred. Pain is sometimes situated in the neck and fauces at the commencement of the attack, but lighter than in angina. Although the fever may be strictly continued, yet often most troublesome exacerbations occur at night, just as in double tertian or quotidian. However so lightly he may be covered with bedclothes, the patient does not lie in bed continuously without great danger; for the fever being then turned towards the brain he falls easily into coma or delirium. And, as I truly acknowledge, there is such an inclination in this disease to fall into delirium that often it suddenly and spontaneously steals over the patient unawares, without any cause. But the delirium does not rise in this fever to that pitch of irascibility and fury observed in those who are attacked with variola and other fevers; indeed the sick have rather a tranquil delirium, from time to time chattering nonsense. From the untimely use of cordials and a regimen a little stimulating, petechiæ often appear, and, in youths possessed of a sanguine temperament, maculæ, even purpuræ, a most certain sign of high inflammation, appear in this as in any other kind of acute disease. Now and then miliary eruptions, as they are called, are scattered over the surface of the body, not very different from measles, unless they are more red, and when they recede do not leave those furfuraceous scales which are seen in measles. These, indeed, sometimes break out of their own accord, but are oftener forced out by heat of the bed or the diet. The tongue, in proportion to the diet furnished, is moist or dry. When it becomes dry it is of a brown color in the middle and white on the edges. But where the tongue is moist it is white in every part, having a rough surface and a white coating; for if the patient becomes heated by a diet justly forbidden, the tongue is generally brownish and arid; but if otherwise, it is moist and white. The same may be said of the perspiration, which exudes in proportion to the varying regimen above mentioned; for if the patient is kept too warm, a viscous sweat constantly pours out, especially from the head. Although the perspiration flows copiously and uniformly from every part, he feels but little relief, whence it follows that such sweats are symptomatic and not critical. If a sweat was excited on the first day of the attack by artificial means, usually it caused the transfer of the morbid action, if not to the head, at least to the joints. But when the fever is situated in the head and at the same time the delirium has increased, no sign of fever remains, except that the pulse is now fast, now slow; at length, however, when from bad management, the spirit is led into every kind of confusion, the pulse becomes irregular, with subsultus tendinum; and not long after, death occurs."

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* Dr. Gallup. Epidemic Diseases of Vermont. Boston. 1815.

From 1691 to 1694 the disease prevailed in Italy; in 1698, in England and at Halle.*

During the eighteenth century it occurred first in Prussia in 1704.

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* Gallup and Buserius, op. cit.

England in 1710 and 1741, and Piedmont in 1720, were visited by a disease called spotted fever.*

In 1733 Edinburgh was under its influence. In this case the disease was accompanied by sore throat.†

In 1746, 1756, '57, and '58, France experienced the ravages of an epidemic. During the latter year it prevailed in the French fleet at Brest, under Admiral Dubois de la Mothe, and extended into the city. Fonsagrives gives the following description of the symptoms: "The patients felt at the commencement a heaviness of the head with acute pain at the superciliary ridges; their powers were weakened; the pulse was full and frequent; the skin was dry and burning; the tongue red; vomiting or at least nausea was commonly experienced; the epigastric region was the seat of discomfort and of an indefinable anxiety; they complained of a very grievous aching of the spine; constipation existed. Such were the symptoms of the commencement. In six or seven days the symptoms became singularly grave; the pulse lost its fulness, it became small and deep; there was tympanites; subsultus tendinum, buboes, petechiæ and parotitis appeared; the patient fell into coma, in which he usually died." In this epidemic about one in fifty passed worms.‡ The same year the epidemic was seen at Vienna; in 1764, at Naples and Montecchi; in 1765, at Tyrone, Ireland; in 1767, in Tuscany and the district of Aemilia; in 1771 and 1772, at Vienna.§

Sir John Pringle, in his work on the diseases of the army, first published in 1752, gives an account of jail or hospital fever, which, in many respects, reminds one of cerebro-spinal meningitis. It was introduced by changes of heat and cold, trembling, numbness and loss of appetite; skin hot; pulse at first a little quicker than natural; some pain and confusion of head, and dejection of spirits; pulse quick and varying in the same day, both as to strength and fulness. Bleedings were injurious, especially if repeated. Blood commonly little altered, sometimes fluid and the crassamentum resolved. Sometimes diarrhœa, when patient is kept too cool; if kept warm, constipation rather. Calor mordax. After a while delirium sets in. A petechial efflorescence is a frequent but not inseparable attendant on the fever, which is sometimes of a brighter or paler red, at other times of a livid color, but never rises above the skin. The spots were small but generally confluent. In a few cases there were purple streaks and blotches. The duration was from seven to fourteen or twenty days." He does not mention that any cases were so short as is sometimes seen in cerebro-spinal meningitis. In post-mortem examinations there were found cases of suppuration of the brain, which he calls abscesses. Purulent matter was found in the ventricles in one case, and the whole cortical and medullary substance was uncommonly flaccid and tender. In one case the brain, in another the cerebellum, was suppurating. In two the cortical substance of the brain had an inflammatory appearance, but no suppuration. In some the intestines were diseased. The cause he considers to be a vitiated state of the air.

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* Cop. Med. Dict., Webster on Pestilence.

† Buserius, op. cit.

‡ Annales d'Hyg. Pub. et de Med. Leg., t. 12.

§ Buserius.

In 1788 an epidemic occurred in Cornwall, Eng., which was compared by Dr. Simmons with typhus. The account of the symptoms is not very full, but the disease strongly resembles cerebro-spinal meningitis.*

In the early part of the nineteenth century there were not many epidemics of this disease, but about 1837 it became more prevalent, especially in France.

In Geneva in 1805 a disease was seen which resembled cerebro-spinal meningitis in its sudden invasion, vomiting, pain in the head, rigidity of the spine, occasional petechiæ; the principal lesion was engorgement of the brain. One quarter died. Its attack was not general. It prevailed for only three months.†

In the same year a case occurred at Strasbourg, terminating fatally after two relapses, the last one being accompanied by cerebral symptoms. At the post-mortem the vessels of the head and membranes were engorged with blood; serous fluid was found between the meninges above the hemispheres. The brain was soft, the ventricles were dilated and contained about four ounces of turbid serum, with a deposit of pultaceous, puriform matter lining their cavity. There were also lesions of the lungs and heart.‡

On the 23d March, 1807, a family of fourteen persons who resided on one of the high declivities of Dartmoor in Blackaton, near Ashburton, were attacked with a disease which had many of the characteristics of cerebro-spinal meningitis. Five persons were attacked, of whom four died. One of them, however, was not in the family, and had not been near any of the sick. The symptoms were briefly these: pain in the head with slight rigors, slight convulsions of the limbs, nausea, thirst, pupils dilated, pulse weak and rather rapid, occasionally soreness of the throat at the commencement, in two cases petechiæ, and in two pain in the foot and lower limbs. There was no post-mortem. This disease did not spread, and these were the only cases. Nothing is said with regard to the situation of the house or the circumstances of the family, and the disease may have been typhus from some local cause, though it had a strong resemblance to cerebro-spinal disease.§

In the same year the Spanish prisoners who were confined at Briançon were attacked by a disease which was said by M. Billerey, physician in chief of the civil and military hospital at Grenoble, to be the same as afterwards appeared at Grenoble and Mayence, which was considered by M. Boudin as cerebro-spinal meningitis.*

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* London Medical Journal, vol. x.

† Vieusseux in Jour. de Med. Chir. et Phar., t. xi.

‡ Journ. de Med., Chir. et Phar., &c., vol. x.

§ Med. and Phys. Jour., vol. xxviii.

In 1814, a disease appeared at Grenoble, which is described by Comte as follows:—"It showed itself at Grenoble during the months of February, March and April, 1814, in the garrison. The larger part came from the army of Mont Blanc, where, during very severe cold, they had performed very hard service, always in the snow, and exposed day and night to great fatigue; those who were attacked were almost all among the new recruits. The disease began as a true catarrhal, nervous or ataxic fever; at the end of two or three days the eyes became bright and flashing; the conjunctiva was injected, the muscles of the face exhibited convulsive movements, then appeared tetanic stiffness of the upper part of the body, the head being constantly bent back and immovable. The headache was sharp and constant, and was observed principally at the posterior part of the neck; a delirium, more or less violent, supervened. The disease frequently attacked persons in the hospital on account of other complaints. MM. Billerey and Bélon, physicians attached to the hospital, and who saw the first patients, thought that this was the same disease as the nervous fever of Dresden, Leipsic and Mayence."

"In every patient who died, there was constantly found dilatation of the cerebral bloodvessels, traces of inflammation, portions of that viscus apparently macerated and its various cavities filled with varying quantities of serum. The examination, extended even into the spinal canal, disclosed traces of inflammation of the internal surface of the membranes; similar appearances of a livid or dull red color in the cord itself, with some portions of the surface macerated and showing undoubted evidences of suppuration."†

The same disease also occurred at Metz, in 1815.‡

Biett, on the 14th of July, 1814, sustained a thesis before the Faculty of Medicine of Paris, wherein he asserted that the disease which had appeared in the army, and which he had observed at the Hospital Saint Louis, was not typhus, but a cerebro-spinal meningitis.

During the spring of 1815, there occurred at the University of Cambridge, Eng., an epidemic which in some of its symptoms and the *post-mortem* appearances very much resembled cerebro-spinal meningitis. The account of the symptoms is not very full, but the following case will serve to show the resemblance:—

"Mr. Joseph Wilson, æt. 19, had been in general good health, with the exception of occasional pain in the head. When I first saw him (March 25th, 2 o'clock in the morning), he complained of severe pain across the forehead, and heaviness over the eyes; his nurse observed that she had several times found him wandering; it is probable that some slight delirium had existed from the commencement of the disease. My suspicions on this head arise from the mistakes he made in respect to dates. His skin was hot and dry, his countenance flushed, his tongue white, his appetite good, and his pulse 120 and full. From what I could collect, the disease had commenced March 15th, with the symptoms I have mentioned, but in less degree. 26th.—Symptoms somewhat aggravated. 27th, 2 o'clock in the morning, furious delirium came on, which left him at 8 o'clock, and his mind returned to the state in which it was when I first saw him. At 2 o'clock in the afternoon his body became sensibly cold, and was followed by moisture of the skin." He lived till April 1st, sometimes seeming better, and sometimes all the symptoms becoming more severe, and died at 1 o'clock on that day.

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* Boudin on Cerebro-spinal Meningitis, in Arch. Gen. de Med., Avr., 1849.
† Receuil Gen. de Med., t. lviii.
‡ Boudin, Arch. Gen. de Med., Avr., 1849.

"*Post Mortem.*—On removing the calvaria, the vessels of the dura mater appeared distended with blood; the other vessels of the brain were fuller than natural; between the dura mater and pia mater there was a large quantity of fluid. The medullary substance of the brain contained many blotches of blood. The lateral ventricles were much distended with fluid. The gall-bladder was found empty. The stomach and intestines were much distended with flatus. The thorax was not examined.

"P. S.—He had also convulsive movements, especially of upper extremities, and subsultus tendinum and floccitation."*

[To be continued.]

THE BOSTON MEDICAL AND SURGICAL JOURNAL.

BOSTON: THURSDAY, AUGUST 23, 1866.

SEWING MACHINES.

If labor-saving inventions are a blessing to mankind—if doing a piece of work in one hour without proportionate fatigue is better than doing the same in six—if time is money—if hurry and care and anxiety in managing household affairs can be greatly lightened by any contrivance that the wit of man is capable of devising—then is the great American invention of the sewing machine worthy a most exalted position among the contrivances of human ingenuity. Surely nothing in modern days has done so much to diminish the weary labors of the weaker portion of humanity, the perpetual "stitch, stitch, stitch," which has worn out so many victims, as this faithful servant which now does its nimble work in almost every household. Its introduction, however, excited not a little apprehension among thinking people, lest its immense capacity for rapid execution should so far supersede hand work as to throw out of employment many industrious women, who

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[*] Med. Trans. of Col. of Physicians of London, vol. v., 1815.

depended upon the needle for their daily subsistence, and thus prove it to be a gift of very equivocal value to the world after all. Experience, however, has shown that in this, as in all other instances of a similar character, the public soon accommodates itself to the new order of things, and new openings are found for the industrial force for the time deprived of its usual resources. The many new occupations which of late years have given employment to our young women seem to have created a demand which is not more than met by the supply.

Other considerations in time presented themselves to medical men—such as the possibility that the mechanical force required to operate these machines might overtask the physical strength of the sex for whose use they were specially intended. As employed in doing the work of most private families, accomplishing in a few hours the work of days, it was hardly to be apprehended that this could be a serious evil. But when adopted, as it soon got to be, in large manufacturing establishments, where the labor was continued from morning to night throughout the week, and week after week, month after month, it required no special gift of prophecy to anticipate that this possibility would become a certainty. We speak to the experience of most physicians, we believe, when we say, that sewing-machine work has got to be a very productive source of debility, and nervous disorders in females. Exhaustion, emaciation, leucorrhœa with its concomitant backache, are among the most common effects of too assiduous application in driving and feeding this untiring and vivacious little instrument. We have frequently been obliged, in common with most of our medical brethren, to restrict its use very greatly or to interdict it altogether. We have been led to take up this topic, however, at the present time, by reading in the *Union Médicale* an article which puts even a graver aspect on the effects of excessive use of this valuable invention. The article is entitled "The Influence of Sewing Machines on the Health and Morality of Workwomen." It is an analysis of a paper read to the *Société Médicale des Hopitaux* of Paris, at the meeting of May 9th, by M. Guibout. He begins with the recital of a case. A young woman, whom he had known as the very picture of vigorous health, presented herself at his office in such a condition of emaciation, and with such a change of countenance, that he was greatly shocked at her appearance. The explanation which she gave was as follows. For seven months, from morning till night, she had worked at a sewing machine, known as the "American machine." The constant motion of the lower extremities in propelling it had produced such an excessive excitement of the sexual organs that she was often compelled to suspend her work; and to the frequency of this effect and the fatigue resulting from it, she attributed the leucorrhœa and attendant loss of flesh and strength from which she was suffering. The effect seemed to be naturally enough explained by the cause alleged, especially as in some of the machines at which she had worked the pedals were depressed alternately with one foot and the other. This case, so serious in its nature, was regarded by M. Guibout as probably the result of a peculiar susceptibility on the part of the patient, and so very exceptional at the time as only worthy of record as a curiosity. But during the past year, he goes on to say, he found in the hospital Saint-Louis, three similar cases; and during the present year he had already found five in the same hospital. He also adds that within a month "two females, entirely unknown to each other, and working in different shops, called upon him on the same day, to consult him for similar symptoms. The first of these, a blonde, in the most vigorous health when she began to work at the machine, in seven or eight months had become enfeebled, her *embonpoint* was gone, her general health had declined, and she had become the subject of a profuse leucorrhœa, which was daily increasing. She said also that many of the girls in the same establishment were affected in the same way, by the same cause, "the continual movement of the lower limbs, the jar and the swaying of the body." She denied, however, that she had been troubled by the special symptoms mentioned by the first patient, but said that many of her companions had been. Many of them had been so annoyed as to be obliged frequently to suspend their work and leave the shop for the purpose of bathing with cold water.

The second of these two patients was a brunette, of entirely different temperament from the other. She had been obliged to give up her place after working at the machine for a year, on account of the same symptoms. To the inquiry as to any local excitement produced by it, she answered in the affirmative. To translate her own words: "Among 500 women who worked with me, there were at least 200 who, to my knowledge, suffered as I did; so that the operatives were constantly changing, none of them being able to stay long. It is a constant going and coming of women, who enter strong and well, and who go out weak and emaciated."

M. Guibout went on to recite other instances equally serious, but it is not necessary to quote them. The subject is one of very grave moment and worthy of the consideration of every physician. In the discussion which followed the reading of his paper, some of the members of the Society were disposed to question the frequency of the peculiar symptoms which he reported. He, however, maintained his position, urging that it was very difficult to get a confession from many of the victims of the machine, so that when directly interrogated, a negative response should not always be received as the truth. The large number of cases which had come under his own observation had led him to lay this painful subject before the Society.

These cases speak for themselves, and open a new chapter in the history of an invention which is generally regarded as only beneficent in its operations. In America, we believe, it is usually the case that in manufacturing establishments which run a considerable number of these machines, steam or some other mechanical motive power is employed. The admirable little hot-air engines, safe and moderately expensive as they are, which are becoming so popular, might be most admirably employed for such a purpose, while in winter they would help to warm the working apartments. But there are many small establishments, where only a few hands are employed, in which the treadle is the only motive power engaged. In such establishments we may look for the evils spoken of above. We have felt it our duty to lay this subject before the profession, feeling that if all these evils are found to exist here, their personal influence will have great weight in inducing the principals of such establishments to spare their operatives the terrible physical and moral injury depicted by M. Guibout, by the introduction of suitable machinery.

Death of Dr. Nathan Hayward.—Died at St. Louis, of cholera, on the 17th inst., Dr. Nathan Hayward, formerly of Roxbury, Mass., aged 33 years. Dr. Hayward was widely known in this community, and his sudden death will be felt as a personal loss by many warmly attached friends. His nature was peculiarly genial and kindly, so that he endeared himself in an unusual degree to all who knew him. He was a young surgeon of great promise, and had served with distinction through the recent war as Surgeon of the 20th Massachusetts regiment, which he accompanied to the field at its first organization. Dr. Hayward had been practising in St. Louis for the year past, and was about to be married to the daughter of Charles Howard, Esq., of Springfield, Mass., when he was thus cut off, a victim to his assiduous devotion to the unfortunate sufferers by the prevailing epidemic in the city of his adoption.

Death of MM. Gibert and Chaussier by Cholera.—Recent arrivals from Paris announce the death, on the 31st ult., at the age of 69 years, of the distinguished French dermatologist M. Gibert, by the reigning epidemic. M. Gibert had suffered for several days with the premonitory symptoms, but neglected to adopt any precautionary treatment. He had repeatedly at the meetings of the French Academy denied the frequency and significance of the premonitory diarrhœa. He died in a few hours after being seized with cholera. For more than twenty years he had been one of the physicians of the Hospital Saint Louis, and was widely known for his acuteness and quickness of diagnosis of cutaneous disease. His writings and his clinical courses have made him illustrious. When he succumbed to the fatal malady, he was unwilling to take any remedies, but turned only to his spiritual adviser for comfort and consolation ; and died, in the words of his eulogist at his funeral, M. Hardy, "a rare example of resignation and courage."

M. Franck Chaussier was the second and only surviving son of the distinguished François Chaussier, of the Academy of Sciences, who died in 1828. The son did little to sustain the reputation of his father, and after leading a reckless life has left to the hospitals of Paris a fortune of 850,000 francs, bequeathing to his excellent wife a mere pittance of 5000 francs.

Progress of Cholera in the United States.—In the absence of authentic official statements we do not think it worth while to copy the daily newspaper reports of the mortality in different places. At New York and on the islands in the vicinity, at Brooklyn and Philadelphia it has almost died out. The number of cases is said to be diminishing at New Orleans and St. Louis. At the latter city, during the week ending on Friday the 17th inst., there were 895 burials, of which 648 were from cholera, not including the deaths at quarantine, and at the smallpox hospitals in the various wards. The disease has raged fearfully at Cincinnati, and has made its appearance at Chicago and Louisville. It is very severe on the river plantations near New Orleans, chiefly among the negroes. Its progress up the Mississippi, and its distribution among the cities and towns on its banks or on tributary streams, are a striking illustration of its portability, and of the law of its advance only so fast as it is conveyed by man. As yet we have had but one case in Boston, that of the soldier who brought the disease from Hart's Island some weeks since.

The Gazette Médicale of Montreal closed its career with the number for July, at the end of its first year. If we mistake not, there is now no medical journal published in Canada or the British Provinces. Each in turn has succumbed to the same cause, inanition from want of support by the medical profession in British America. This is a state of things which does little credit to their professional zeal or enterprise.

Messrs. Editors,—Presuming that the frequency with which hernia occurs in our male population, and the comparative frequency of the several varieties, are matters of interest to the profession, I present the following statement, obtained in the examination of men for military service:—

Number of men examined, 10,000. Number rejected on account of herniæ, 455, or 45·5 per 1000.

VARIETIES.—*Femoral Hernia*—	Right femoral hernia,	1	
	Double " "	1	2
Umbilical Hernia,			6
Ventral Hernia,			9
Inguinal Hernia—	Right inguinal,	234	
	Left "	173	
	Double "	31	438
			455

The reader will be struck with the rarity of femoral hernia, not merely in comparison with inguinal hernia, but with the other and less frequent forms of the affection.

It is worthy of note that the *right* is the affected side in very nearly two thirds of the cases of inguinal hernia.

Malden, August 8th, 1866. JOHN L. SULLIVAN, M.D.

Memorandum for the Information of Persons desirous of entering the Medical Corps of the Army.—[Extracts from laws of the United States.] Act of Congress approved July, 1866.

"SEC. 17. *And be it further enacted,* That the Medical Department of the Army shall hereafter consist of one Surgeon General * * * One Assistant Surgeon General * * * * * One Chief Medical Purveyor and four Assistant Medical Purveyors * * * Sixty Surgeons, with the rank, pay and emoluments of Majors of Cavalry. One hundred and fifty Assistant Surgeons, with the rank, pay and emoluments of First Lieutenants of Cavalry, for the first three years service, and with the rank, pay and emoluments of Captains of Cavalry after three years service. * * * and all the original vacancies in the grade of Assistant Surgeons shall be filled by selection by examination."

The number of vacancies now existing in the Medical Corps of the U. S. Army is sixty, forty-six of which are original vacancies created by the Act of Congress approved July 28, 1866, as quoted above.

to All candidates for appointments in the Medical Corps, must apply to the Surgeon General, U. S. Army, for an invitation to appear before the Medical Examining Board. The application must be in the hand writing of the candidate, stating age and birthplace, and be accompanied by testimonials from Professors of the College in which he graduated, or from other physicians of good repute. If the candidate has been in the medical service of the army during the war, the fact should be stated, together with his former rank, and time and place of service, and testimonials as to qualifications and character from the officers with whom he has served should also be forwarded.

Candidates must be graduates of some regular medical college, proof of which must be submitted to the Board before examination.

Foreign Medical Intelligence.—The son of Prof. Hebra, a cadet in the Austrian army, is wounded and a prisoner in the hands of the Prussians. The son of Prof. Pilha, aged 18 years, a lieutenant of cuirassiers, was mortally wounded at Skalitz, and also fell into the hands of the Prussians.

We see it stated that since the brief campaign in which Prussia has been so triumphant, Austria has joined the Association for the relief of suffering on the battlefield. It will be remembered that before the war she was the only Christian nation of Europe which held back from joining this truly humane organization.

The movable ambulances of the Prussian army contain 20,000 beds, which are stationed here and there, as occasion requires, in small temporary hospitals, to avoid crowding and the accompanying evils. Six thousand beds have been sufficient thus far, it is said, to meet all the wants of the army.

Sir James Clark has been elevated, by order of Queen Victoria, to the dignity of Commander of the Order of the Bath.

VITAL STATISTICS OF BOSTON.

For the Week ending Saturday, August 18th, 1866.

DEATHS.

	Males.	*Females.*	*Total.*
Deaths during the week - - - - - - -	54	49	103
Ave. mortality of corresponding weeks for ten years, 1855—1865	54.3	53.1	107.4
Average corrected to increased population - - - - -	00	00	118.16
Death of persons above 90 - - - - - - -	0	1	1

Correction.—On page 68 of the last number of the Journal, 18th line from bottom, read 25 deaths, instead of "28" deaths.

Communications Received.—Rational Treatment at La Charité; Treatment of Pneumonia.—Uterine Hæmorrhage, by E. J. Townsend, M.D., of South Natick.

Deaths in Boston for the week ending Saturday noon, Aug. 18th, 103. Males, 54—Females, 49. Accident, 3—apoplexy, 1—inflammation of the bowels, 2—disease of the brain, 3—inflammation of the brain, 3—cancer, 2—cholera infantum, 20—cholera morbus, 1—consumption, 15—convulsions, 2—croup, 1—diarrhœa, 4—dropsy, 3—dropsy of the brain, 1—drowned, 3—dysentery, 9—typhoid fever, 4—infantile disease, 2—disease of the kidneys, 1—disease of the liver, 1—inflammation of the lungs, 4—marasmus, 1—old age, 1—premature birth, 3—malignant pustule, 1—ulceration of the stomach, 1—tumor, 1—unknown, 8—whooping cough, 2.

Under 5 years of age, 49—between 5 and 20 years, 12—between 20 and 40 years, 19—between 40 and 60 years, 15—above 60 years, 8. Born in the United States, 73—Ireland, 27 other places, 3.